

09/806003

Practitioner's Docket No. 55709

CHAPTER II

**TRANSMITTAL LETTER
TO THE UNITED STATES ELECTED OFFICE (EO/US)
(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)**

<u>PCT/DE99/02994</u>	<u>17 September 1999</u>	<u>23 September 1998</u>
INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED

METHOD AND CIRCUIT ARRANGEMENT FOR PICTURE-IN-PICTURE INSERTION
TITLE OF INVENTION

Maik BRETT and Manfred MENDE
APPLICANTS

Box PCT
Assistant Commissioner for Patents
Washington D.C. 20231
ATTENTION: EO/US

NOTE: To avoid abandonment of the application, the applicant shall furnish to the USPTO, not later than 20 months from the priority date: (1) a copy of the international application, unless it has been previously communicated by the International Bureau or unless it was originally filed in the USPTO; and (2) the basic national fee (see 37 C.F.R. § 1.492(a)). The 30-month time limit may not be extended. 37 C.F.R. § 1.495.

WARNING: Where the items are those which can be submitted to complete the entry of the international application into the national phase are subsequent to 30 months from the priority date the application is still considered to be in the international state and if mailing procedures are utilized to obtain a date the express mail procedure of 37 C.F.R. § 1.10 must be used (since international application papers are not covered by an ordinary certificate of mailing - See 37 C.F.R. § 1.8.

NOTE: Documents and fees must be clearly identified as a submission to enter the national state under 35 USC 371 otherwise the submission will be considered as being made under 35 USC 111. 37 C.F.R. § 1.494(f).

CERTIFICATION UNDER 37 C.F.R. § 1.10*
(Express Mail label number is **mandatory**.)
(Express Mail certification is optional.)

I hereby certify that this paper, along with any document referred to, is being deposited with the United States Postal Service on this date March 23, 2001, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number **EL835032310**, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Deanna M. Rivernider

(type or print name of person mailing paper)

Deanna M. Rivernider

Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

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"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition" Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

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1. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 U.S.C. 371:

- a. ☒ This express request to immediately begin national examination procedures (35 U.S.C. 371(f)).
- b. ☒ The U.S. National Fee (35 U.S.C. 371(c)(1)) and other fees (37 C.F.R. § 1.492) as indicated below:

2. Fees

CLAIMS FEE	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
<input checked="" type="checkbox"/> *	TOTAL CLAIMS	12- 20 =	0	x \$ 18.00 =	\$0
	INDEPENDENT CLAIMS	2 - 3 =	0	x \$ 80.00 =	\$0
	MULTIPLE DEPENDENT CLAIM(S) (if applicable) + \$270.00				\$
BASIC FEE**	<input type="checkbox"/> U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an international preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO: <input type="checkbox"/> and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(2) to (4) have been satisfied for all the claims presented in the application entering the national stage (37 CFR 1.492(a)(4)) \$96.00 <input type="checkbox"/> and the above requirements are not met (37 CFR 1.492(a)(1)) \$670.00 <input checked="" type="checkbox"/> U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where no international preliminary examination fee as set forth in § 1.482 has been paid to the USPTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO: <input type="checkbox"/> has been paid (37 CFR 1.492(a)(2)) \$760.00 <input type="checkbox"/> has not been paid (37 CFR 1.492(a)(3)) \$970.00 <input checked="" type="checkbox"/> where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 CFR 1.492(a)(5))..... \$860.00				\$860.00
	Total of above Calculations				= \$860.00
SMALL ENTITY	Reduction by ½ for filing by small entity, if applicable. Affidavit must be filed. (note 37 CFR 1.9, 1.27, 1.28)				- \$
	Subtotal				\$860.00
	Total National Fee				\$860.00
	Fee for recording the enclosed assignment document \$40.00 (37 CFR 1.21(h)). (See Item 13 below). See attached "ASSIGNMENT COVER SHEET".				\$
TOTAL	Total Fees enclosed				\$860.00

*See attached Preliminary Amendment Reducing the Number of Claims.

- i. ☒ A check in the amount of \$860.00 to cover the above fees is enclosed.
- ii. ☐ Please charge Account No. _____ in the amount of \$ _____.
A duplicate copy of this sheet is enclosed.

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****WARNING:** *"To avoid abandonment of the application the applicant shall furnish to the United States Patent and Trademark Office not later than the expiration of 30 months from the priority date: * * * (2) the basic national fee (see § 1.492(a)). The 30-month time limit may not be extended." 37 C.F.R. § 1.495(b).*

WARNING: *If the translation of the international application and/or the oath or declaration have not been submitted by the applicant within thirty (30) months from the priority date, such requirements may be met within a time period set by the Office. 37 C.F.R. § 1.495(b)(2). The payment of the surcharge set forth in § 1.492(e) is required as a condition for accepting the oath or declaration later than thirty (30) months after the priority date. The payment of the processing fee set forth in § 1.492(f) is required for acceptance of an English translation later than thirty (30) months after the priority date. Failure to comply with these requirements will result in abandonment of the application. The provisions of § 1.136 apply to the period which is set. Notice of Jan. 3, 1993, 1147 O.G. 29 to 40.*

3. [X] A copy of the International application as filed (35 U.S.C. 371(c)(2)):

NOTE: Section 1.495 (b) was amended to require that the basic national fee and a copy of the international application must be filed with the Office by 30 months from the priority date to avoid abandonment. "The International Bureau normally provides the copy of the international application to the Office in accordance with PCT Article 20. At the same time, the International Bureau notifies applicant of the communication to the Office. In accordance with PCT Rule 47.1, that notice shall be accepted by all designated offices as conclusive evidence that the communication has duly taken place. Thus, if the applicant desires to enter the national stage, the applicant normally need only check to be sure the notice from the International Bureau has been received and then pay the basic national fee by 30 months from the priority date." Notice of Jan. 7, 1993, 1147 O.G. 29 to 40, at 35-36. See item 14c below.

- a. ☐ is transmitted herewith.
- b. ☐ is not required, as the application was filed with the United States Receiving Office.
- c. ☒ has been transmitted
- i. ☒ by the International Bureau.
Date of mailing of the application (from form PCT/IB/308): _____.
- ii. ☐ by applicant on _____.
Date

4. [X] A translation of the International application into the English language (35 U.S.C. 371(c)(2)):

- a. ☒ is transmitted herewith.
- b. ☐ is not required as the application was filed in English.
- c. ☐ was previously transmitted by applicant on _____
Date
- d. ☐ will follow.

5. [X] Amendments to the claims of the International application under PCT Article 19 (35 U.S.C. 371(c)(3)):

NOTE: The Notice of January 7, 1993 points out that 37 C.F.R. § 1.495(a) was amended to clarify the existing and continuing practice that PCT Article 19 amendments must be submitted by 30 months from the priority date and this deadline may not be extended. The Notice further advises that, "The failure to do so will not result in loss of the subject matter of the PCT Article 19 amendments. Applicant may submit that subject matter in a preliminary amendment filed under section 1.121. In many cases, filing an amendment under section 1.121 is preferable since grammatical or idiomatic errors may be corrected." 1147 O.G. 29-40, at 36.

- a. ☐ are transmitted herewith.
b. ☐ have been transmitted
i. ☐ by the International Bureau.
Date of mailing of the amendment (from form PCT/IB/308): _____

- ii. ☐ by applicant on _____
Date
- c. ☒ have not been transmitted as
- i. ☒ applicant chose not to make amendments under PCT Article 19.
Date of mailing of Search Report (from form PCT/ISA/210): 10/03/00
- ii. ☐ the time limit for the submission of amendments has not yet expired.
The amendments or a statement that amendments have not been made will be transmitted before the expiration of the time limit under PCT Rule 46.1.
6. ☒ A translation of the amendments to the claims under PCT Article 19 (38 U.S.C. 371(c)(3)):
- a. ☐ is transmitted herewith.
- b. ☐ is not required as the amendments were made in the English language.
- c. ☒ has not been transmitted for reasons indicated at point 5(c) above.
7. ☒ A copy of the international examination report (PCT/IPEA/409)
☒ is transmitted herewith.
☐ is not required as the application was filed with the United States Receiving Office.
8. ☐ Annex(es) to the international preliminary examination report
- a. ☐ is/are transmitted herewith.
- b. ☐ is/are not required as the application was filed with the United States Receiving Office.
9. ☐ A translation of the annexes to the international preliminary examination report
- a. ☐ is transmitted herewith.
- b. ☐ is not required as the annexes are in the English language.
10. ☒ An oath or declaration of the inventor (35 U.S.C. 371(c)(4)) complying with 35 U.S.C. 115
- a. ☐ was previously submitted by applicant on _____
Date
- b. ☐ is submitted herewith, and such oath or declaration
- i. ☐ is attached to the application.
- ii. ☐ identifies the application and any amendments under PCT Article 19 that were transmitted as stated in points 3(b) or 3(c) and 5(b); and states that they were reviewed by the inventor as required by 37 C.F.R. 1.70.
- iii. ☒ will follow.

II. Other document(s) or information included:

11. ☒ An International Search Report (PCT/ISA/210) or Declaration under PCT Article 17(2)(a):
- a. ☒ is transmitted herewith.
- b. ☐ has been transmitted by the International Bureau.
Date of mailing (from form PCT/IB/308): _____
- c. ☐ is not required, as the application was searched by the United States International Searching Authority.
- d. ☐ will be transmitted promptly upon request.

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- e. ☐ has been submitted by applicant on _____
Date
12. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98:
 a. ☒ is transmitted herewith.
 Also transmitted herewith is/are:
☒ Form PTO-1449 (PTO/SB/08A and 08B).
☒ Copies of citations listed.
 b. ☐ will be transmitted within THREE MONTHS of the date of submission of requirements under 35 U.S.C. 371(c).
 c. ☐ was previously submitted by applicant on _____
Date
13. ☐ An assignment document is transmitted herewith for recording.
- A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.
14. ☒ Additional documents:
 a. ☒ Copy of request (PCT/RO/101)
 b. ☒ International Publication No. WO 00/18115
 i. ☒ Specification, claims and drawing
 ii. ☐ Front page only
 c. ☒ Preliminary amendment (37 C.F.R. § 1.121)
 d. ☒ Other
- Preliminary Amendment, Forms Form PCT/IB/304, PCT/IB/306, English translation of the amended pages filed under Art. 34 PCT, cited references.,
15. ☒ The above checked items are being transmitted
 a. ☒ before 30 months from any claimed priority date.
 b. ☐ after 30 months.
16. ☐ Certain requirements under 35 U.S.C. 371 were previously submitted by the applicant on _____, namely:

AUTHORIZATION TO CHARGE ADDITIONAL FEES

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges if extra claims are authorized.

NOTE: "A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

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NOTE: "Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

☒ The Commissioner is hereby authorized to charge the following additional fees that may be required by this paper and during the entire pendency of this application to Account No. **04-1105**.

☒ 37 C.F.R. 1.492(a)(1), (2), (3), and (4) (filing fees)

WARNING: Because failure to pay the national fee within 30 months without extension (37 C.F.R. § 1.495(b)(2)) results in abandonment of the application, it would be best to always check the above box.

☒ 37 C.F.R. 1.492(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.492(d)), it might be best not to authorize the PTO to charge additional claim fees, except possible when dealing with amendments after final action.

☒ 37 C.F.R. 1.17 (application processing fees)

☒ 37 C.F.R. 1.17(a)(1)-(5)(extension fees pursuant to § 1.136(a).

☐ 37 C.F.R. 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying . . . issue fee." From the wording of 37 C.F.R. § 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

☐ 37 C.F.R. § 1.492(e) and (f) (surcharge fees for filing the declaration and/or filing an English translation of an International Application later than 30 months after the priority date).



SIGNATURE OF PRACTITIONER

Reg. No.: 33,860

Peter F. Corless

(type or print name of practitioner)

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Docket No. 55709

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Maik BRETT; Manfred MENDE;

Express Mail Label No. EK92917576US

Filed: Herewith

For: METHOD AND CIRCUIT ARRANGEMENT FOR PICTURE-IN-PICTURE
INSERTION

ASSISTANT COMMISSIONER OF PATENTS AND TRADEMARKS
WASHINGTON, D.C. 20231

Sir:

PRELIMINARY AMENDMENT

Applicants file herewith the above-referenced application. Please amend the application as follows.

IN THE CLAIMS

Please claims 1 through 13 without prejudice.

Please add the following new claims.

14. A method for picture-in-picture insertion,
wherein a sequence of insertion pictures ($K_j=K_1, K_2, \dots$) decimated by vertical decimation ($VD \geq 1$) are read into a memory device (S) and subsequently read out,
wherein the insertion pictures (K_j) read out are inserted into a sequence of main pictures ($H_i=H_1, H_2, \dots$),

wherein the memory device (S) has a storage capacity of less than two insertion pictures (K_j) and is subdivided into memory segments (X,Y,Z;A,B,C,D,E) which are continuously overwritten by the insertion pictures, and

wherein a decision is made as to whether the currently written insertion picture (K_j) or the immediately preceding insertion picture (K_{j-1}) is read out,

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wherein more than one memory segment (X,Y,Z;A,B,C,D,E) of the memory device (S) is required for storing an insertion picture (K_j), and in that the memory segments (X,Y,Z;A,B,C,D,E) of the memory device (S) are cyclically overwritten by the insertion pictures (K_j) in a predetermined order.

15. The method of claim 14 wherein the memory segments (X,Y,Z;A,B,C,D,E) are the same size.

16. The method of claim 14 wherein in a manner dependent on the ratio of a reading speed of a read pointer to a writing speed of a write pointer and a relative position of the write pointer in a writing area (I,II; I,II,III) holding the currently written insertion picture, a decision is made as to whether the currently written insertion picture (K_j) or the immediately preceding insertion picture (K_{j-1}) is read out.

17. The method of claim 14 wherein the memory device has a storage capacity which is $(2-1/VD)$ times the storage capacity required for an insertion picture, where VD is the vertical decimation of the insertion picture.

18. The method of claim 17 wherein the memory segments are the same size and the number of memory segments is $2* VD-1$, the number of memory segments required for an insertion picture corresponding to the vertical decimation (VD).

19. The method of claim 18 wherein a memory segment has a storage capacity of $1/VD$ times the storage capacity required for an insertion picture and the decision criterion that is applied is whether the last memory segment (II; III) required for the currently written insertion picture is already being written too.

20. The method of claim 14 wherein the insertion pictures (K_j) and main pictures (H_i) are fields of a monitor picture.

21. The method of claim 14 wherein a comparison is made to determine whether a main picture (H_i) and an insertion picture (K_i) to be inserted into the latter have an identical field position, and, in the case of a differing field position, an identical field position is achieved by address shifting of the main picture (H_i) or of the insertion picture.

22. A circuit arrangement for picture-in-picture insertion having a memory device (S) for storing vertically decimated insertion pictures ($K_j=K_1, K_2, \dots$), the memory device (S) having a storage capacity of less than two insertion pictures (K_j) and being subdivided into memory segments (X,Y,Z;A,B,C,D,E) which can be continuously overwritten by the insertion pictures (K_j), having a control device (3) for reading out the vertically decimated insertion pictures from the memory device (S) and for inserting the insertion pictures (K_j) read out into a sequence of main pictures ($H_i=H_1, H_2, \dots$), and having a decision device for deciding whether the currently written insertion picture (K_j) or the immediately preceding insertion picture (K_{j-1}) is read out,

wherein each memory segment (X,Y,Z;A,B,C,D,E) has a storage capacity of less than one insertion picture (K_j), and in that the memory segments (X,Y,Z;A,B,C,D,E) of the memory device (S) can be cyclically overwritten by the insertion pictures (K_j) in a predetermined order.

23. The circuit arrangement of claim 22 wherein the memory segments (X,Y,Z;A,B,C,D,E) are the same size.

24. The circuit arrangement of claim 22 wherein the memory device has a storage capacity which is $(2-1/VD)$ times the storage capacity required for an insertion picture, where VD is the vertical decimation of the insertion picture.

25. The circuit arrangement of claim 24 wherein the memory segments are the same size and the number of memory segments is $2^* VD-1$, the number of memory segments required for an insertion picture corresponding to the vertical decimation (VD).

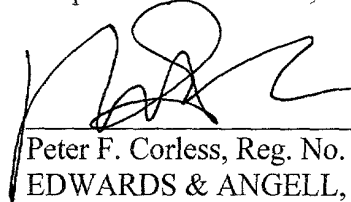
26. The circuit arrangement of claim 22 wherein in a manner dependent on the ratio of a reading speed of a read pointer to a writing speed of a write pointer and a relative position of the write pointer in a writing area holding the currently written insertion picture, the decision device decides whether the currently written insertion picture (Kj) or the immediately preceding insertion picture (Kj-1) is read out.

REMARKS

Claims 1-13 have been cancelled without prejudice, and claims 14-26 have been added.
No new matter has been added.

Early consideration and allowance of the application are earnestly solicited.

Respectfully submitted,



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Docket No. 55709

U.S. PATENT APPLICATION

Title: **METHOD AND CIRCUIT ARRANGEMENT FOR PICTURE-
IN-PICTURE INSERTION**

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Description

Method and circuit arrangement for picture-in-picture insertion

5

The invention relates to a method for picture-in-picture insertion in accordance with the preamble of claim 1, and to a circuit arrangement for picture-in-picture insertion in accordance with the preamble of claim 9.

10

In the case of such picture-in-picture insertion (PIP), a smaller insertion picture (small picture) is inserted into a larger main picture. The insertion picture is decimated in accordance with the size reduction and is continuously read into a memory device, older stored pictures being overwritten, and then the insertion pictures are read out in a manner employing synchronization with the main pictures. Accordingly, the read-out speed of the insertion pictures is generally higher than the writing speed. In this case, the main picture and the insertion picture may, in a known manner, be fields which are used for displaying a monitor picture.

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At specific phase angles of the rasters of the main picture and of the small picture, the higher read-out speed can lead, inter alia, to the read-out pointer overtaking the write pointer and reading out a previous picture stored in the memory device, with the result that a seam occurs in the middle of a displayed small picture and in part the preceding insertion picture is read out. If both insertion pictures originate from different motion phases, a disturbing effect results since moving objects through which the seam runs are displayed with distortion. If the frequencies of the pictures of the insertion channel and main channel correspond only approximately, the result is slow drifting of the disturbance location, which is found to be particularly unpleasant.

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EP 0 739 130 A2 describes a method for eliminating this seam by storing two fields of a small picture, with the result that the field that can be read is always exactly the one which is currently not
5 being written, and, consequently, the read pointer cannot overtake the write pointer. A first and a second memory, which each store a field, are provided for this purpose. This method has the disadvantage, however, that a storage capacity of two insertion pictures or
10 fields is necessary, which entails corresponding costs.

Accordingly, the invention is based on the object of providing a method and a circuit arrangement for picture-in-picture insertion with which the occurrence of a seam in the insertion picture can be
15 prevented in a cost-effective manner and with a relatively low outlay on apparatus.

This object is achieved by means of a method according to claim 1 and a circuit arrangement according to claim 9. The sub-claims describe preferred
20 developments of the method according to the invention and of the circuit arrangement according to the invention.

The invention is based on the concept that it is not necessary, in principle, to store two whole
25 insertion pictures in order to prevent the write pointer from being overtaken by the read pointer. Instead of using a storage capacity of two insertion pictures, a smaller memory device is subdivided into a suitable number of segments, and suitable
30 decision-making is effected to stipulate whether the currently written or the preceding insertion picture is read out.

Consequently, according to the invention - in contrast to the use of two separate memory segments for
35 the currently written and the preceding insertion picture - if appropriate even the currently written insertion picture is read out if it is ensured that the read pointer does not overtake the write pointer.

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For this purpose, memory segments which, in particular, are the same size can be cyclically overwritten in a predetermined order since, in particular, good periodicity of the operation can also
5 be ensured by this means. The method according to the invention can be achieved in an advantageous manner by means of the dimensionings according to claims 3 to 6, in which case, in particular, the decision criterion may be chosen according to claim 6.

10 The invention is explained in more detail below using a number of embodiments with reference to the accompanying drawings in which:

Figure 1 shows a block diagram of a circuit arrangement according to the invention,

15 Figure 2 shows an illustration of a memory device according to a first embodiment of the invention;

20 Figure 3 shows an illustration of a memory device according to a second embodiment of the invention.

In accordance with Figure 1, a sequence of main
25 pictures $H_i = H_1, H_2, H_3, \dots$ are output from a main picture source 1 via a main picture channel 7 to a control device 3. Correspondingly, from an insertion picture source 2, a sequence of insertion pictures $K_j = K_1, K_2, K_3, \dots$ decimated by a decimation
30 device 12, i.e. reduced in size relative to the main pictures, are output to a memory device S and buffer-stored. In this case, both the main pictures H_i and the insertion pictures K_j are fields which are combined e.g. in a line-offset manner to form the
35 overall monitor picture. Afterward, the sequence of small pictures is read out and forwarded to the control device 3 via an insertion picture channel 8. If an asynchronous main picture source 1 and insertion

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picture source 2 are used, the read-out operation of the memory device S is effected in a manner exhibiting synchronization with the main pictures Hi. On account of the decimation, in particular the vertical
5 decimation, the read-out of the insertion pictures Kj from the memory device by the control device 3 takes place more rapidly than the operation of writing to the memory device. The control device 3 combines the main pictures Hi and insertion pictures Kj to form an
10 overall picture which is reproduced on a monitor 6.

1/4 picture-in-picture insertion is assumed below, where the small picture is correspondingly decimated in each case by the factor 2 in the horizontal and vertical. According to the invention, it
15 is provided for this purpose that the memory device has a storage capacity of 1.5 fields (decimated relative to the main pictures) and, in accordance with Figure 2, is subdivided into three memory segments X, Y and Z, all three segments being the same size, i.e. each having a
20 storage capacity of 0.5 field (decimated relative to the main pictures) and being continuously overwritten in this cyclic order. Consequently, a writing start segment I and a second writing segment II are in each case required for a field.

25 Accordingly, in a first storage operation in accordance with Figure 2 a, a memory area formed from the start writing segment X and the second writing segment Y is written to for the first field K1. The second field K2 is correspondingly written to the start
30 writing segment Z and the second writing segment X in the subsequent storage operation in accordance with Figure 2 b, the start segment of the first field K1 already being overwritten in the process of writing to the second writing segment X. During the third storage
35 operation, the field K3 is correspondingly written to the start writing segment Y and the second writing segment Z in accordance with Figure 2 c. Consequently, at the instant when, in Figure 2 c, the write pointer

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is located in the start segment Y, in the location designated by SZ1, the second half of the first field K1 is overwritten, i.e., at this instant, K1 is still partly present, K2 is completely present and K3 is currently being written to the segment Y.

For the read-out operation it must be ensured that, on the one hand, a whole field is read out and, on the other hand, the read pointer does not overtake the write pointer. For this purpose, a decision must be made as to whether the currently written field K_j or the immediately preceding field K_j-1 is read out. Since the difference in the writing and read-out speed is essentially determined by the vertical decimation VD, where VD is a natural number, the decision as to which field is to be read out can be made dependent in each case on VD and on the position of the write pointer in the currently written field. This position of the write pointer generally depends on the position of the small picture in the main picture and hence primarily on the phase angle of the small picture and main picture, the read pointer generally being fixedly coupled to the main picture via the insertion position.

In the case of a vertical decimation of $VD=2$, the read-out speed is about twice as high as the writing speed, with the result that the read pointer would overtake the write pointer in the currently written field if the write pointer has only written less than half of the field, i.e. is still located in the start segment, as is the case in the position SZ1 in Figure 2 c during the writing of the field K3. Consequently, the preceding field K2 must be read out in this case, i.e. the reading start segment is the writing start segment I of the previous field, i.e. the segment Z according to Figure 2 b. By contrast, at the position SZ2 in Figure 2 c, at which the write pointer is already located in the second writing segment Z, the writing start segment Y can be taken as the reading start segment.

Generally, it can be derived from these considerations that $2*VD-1$ segments, each having a storage capacity which corresponds to the quotient of the storage capacity required for an insertion picture and VD , are necessary in order to ensure in each case that either the currently written or the immediately preceding insertion picture can be read out. The total memory space required is thus $(2-1/VD)$ times the storage capacity required for an insertion picture. The saving in comparison with the use of two memory areas for a respective insertion picture thus falls with increasing vertical decimation VD . Since the quotient of reading speed and writing speed can, to a good approximation, be applied as VD , the decisive criterion for the selection of the reading start segment is whether the last segment required for writing the current insertion picture is already being written to.

In the case of $1/9$ picture-in-picture insertion, $VD=3$ and, in accordance with Figure 3, it is necessary correspondingly to choose $2*VD-1=5$ segments A,B,C,D and E each having a storage capacity of $1/3$ field, with the result that a total storage capacity of $5/3$ fields is required. In this case, too, memory segments I, II, III are cyclically overwritten, with the result that the first field is written to the segments A, B and C, the second field to the segments D, E and A, etc. Since the reading speed is about three times higher than the writing speed, the decision criterion to be applied here is whether more than $1/VD = 1/3$ of the memory space required for a field remains to be written to. Consequently, in this case, too, the resulting decision criterion is whether the last segment - in this case the third segment III - required for the current field is already being written to.

In addition to the elimination of the seam, it is furthermore possible to eliminate disturbances that may arise as a result of different field positions in

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the insertion channel 8 and main channel 7, e.g., in the case of a picture composed of line-offset fields, disturbances between the upper field in the main channel 7 and the lower field in the insertion channel 8. This can be ensured e.g. by storing an additional line, with the result that the lines of the upper field of the insertion channel, despite the dependence on the raster position of the field of the main channel, are always displayed relatively above the lines of the lower field of the insertion channel.

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Patent claims

1. A method for picture-in-picture insertion, wherein a sequence of insertion pictures ($K_j = K_1, K_2, \dots$) decimated by vertical decimation ($VD \geq 1$) are read into a memory device (S) and subsequently read out, wherein the insertion pictures (K_j) read out are inserted into a sequence of main pictures ($H_i = H_1, H_2, \dots$), wherein the memory device (S) has a storage capacity of less than two insertion pictures (K_j) and is subdivided into memory segments (X,Y,Z;A,B,C,D,E) which are continuously overwritten by the insertion pictures, and wherein a decision is made as to whether the currently written insertion picture (K_j) or the immediately preceding insertion picture (K_{j-1}) is read out, characterized in that more than one memory segment (X,Y,Z;A,B,C,D,E) of the memory device (S) is required for storing an insertion picture (K_j), and in that the memory segments (X,Y,Z;A,B,C,D,E) of the memory device (S) are cyclically overwritten by the insertion pictures (K_j) in a predetermined order.
2. The method as claimed in claim 1, characterized in that the memory segments (X,Y,Z;A,B,C,D,E) are the same size.
3. The method as claimed in claim 1 or 2, characterized in that, in a manner dependent on the ratio of a reading speed of a read pointer to a writing speed of a write pointer and a relative position of the write pointer in a writing area (I,II; I,II,III) holding the currently written insertion picture, a decision is made as to whether the currently written insertion picture

(Kj) or the immediately preceding insertion picture (Kj-1) is read out.

4. The method as claimed in one of the preceding claims,
characterized

in that the memory device has a storage capacity which is $(2-1/VD)$ times the storage capacity required for an insertion picture, where VD is the vertical decimation of the insertion picture.

5. The method as claimed in claim 4,
characterized

in that the memory segments are the same size and the number of memory segments is $2*VD-1$, the number of memory segments required for an insertion picture corresponding to the vertical decimation (VD).

6. The method as claimed in claim 5,
characterized

in that a memory segment has a storage capacity of $1/VD$ times the storage capacity required for an insertion picture and the decision criterion that is applied is whether the last memory segment (II; III) required for the currently written insertion picture is already being written too.

7. The method as claimed in one of the preceding claims,
characterized

in that the insertion pictures (Kj) and main pictures (Hi) are fields of a monitor picture.

8. The method as claimed in one of the preceding claims,
characterized

in that a comparison is made to determine whether a main picture (Hi) and an insertion picture (Ki) to be inserted into the latter have an identical field position, and, in the case of a differing field position, an identical field position is achieved by

address shifting of the main picture (H_i) or of the insertion picture.

9. A circuit arrangement for picture-in-picture insertion, in particular for carrying out a method as claimed in one of claims 1 to 8, having a memory device (S) for storing vertically decimated insertion pictures ($K_j=K_1, K_2, \dots$), the memory device (S) having a storage capacity of less than two insertion pictures (K_j) and being subdivided into memory segments (X,Y,Z;A,B,C,D,E) which can be continuously overwritten by the insertion pictures (K_j),

having a control device (3) for reading out the vertically decimated insertion pictures from the memory device (S) and for inserting the insertion pictures (K_j) read out into a sequence of main pictures ($H_i=H_1, H_2, \dots$), and

having a decision device for deciding whether the currently written insertion picture (K_j) or the immediately preceding insertion picture (K_{j-1}) is read out,

characterized

in that each memory segment (X,Y,Z;A,B,C,D,E) has a storage capacity of less than one insertion picture (K_j), and

in that the memory segments (X,Y,Z;A,B,C,D,E) of the memory device (S) can be cyclically overwritten by the insertion pictures (K_j) in a predetermined order.

10. The circuit arrangement as claimed in claim 9, characterized

in that the memory segments (X,Y,Z;A,B,C,D,E) are the same size.

11. The circuit arrangement as claimed in claim 9 or 10,

characterized

in that the memory device has a storage capacity which is $(2-1/VD)$ times the storage capacity required for an

insertion picture, where VD is the vertical decimation of the insertion picture.

12. The circuit arrangement as claimed in claim 11, characterized

in that the memory segments are the same size and the number of memory segments is $2 \cdot VD - 1$, the number of memory segments required for an insertion picture corresponding to the vertical decimation (VD).

13. The circuit arrangement as claimed in one of claims 9 to 12,

characterized

in that in a manner dependent on the ratio of a reading speed of a read pointer to a writing speed of a write pointer and a relative position of the write pointer in a writing area holding the currently written insertion picture, the decision device decides whether the currently written insertion picture (Kj) or the immediately preceding insertion picture (Kj-1) is read out.

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Abstract

Method and circuit arrangement for picture-in-picture insertion

The invention relates to a method and a circuit arrangement for picture-in-picture insertion, in which a sequence of insertion pictures ($K_j = K_1, K_2, \dots$) is read, with vertical decimation ($VD \geq 1$), into a memory device (S) and subsequently read out, the sequence of insertion pictures (K_j) read out is inserted into a sequence of main pictures ($H_i = H_1, H_2, \dots$) and the memory device (S) is continuously overwritten by the insertion pictures.

In order to prevent the occurrence of a seam during the insertion of the insertion pictures into the main pictures in a cost-effective manner and with a relatively low outlay on apparatus, the memory device (S) is subdivided into memory segments (X,Y,Z) which are continuously cyclically overwritten by the insertion pictures, the memory device (S) has a storage capacity of less than two insertion pictures, and a decision is made as to whether the currently written insertion picture (K_j) or the immediately preceding insertion picture (K_{j-1}) is read out.

Figure 2

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FIG 1

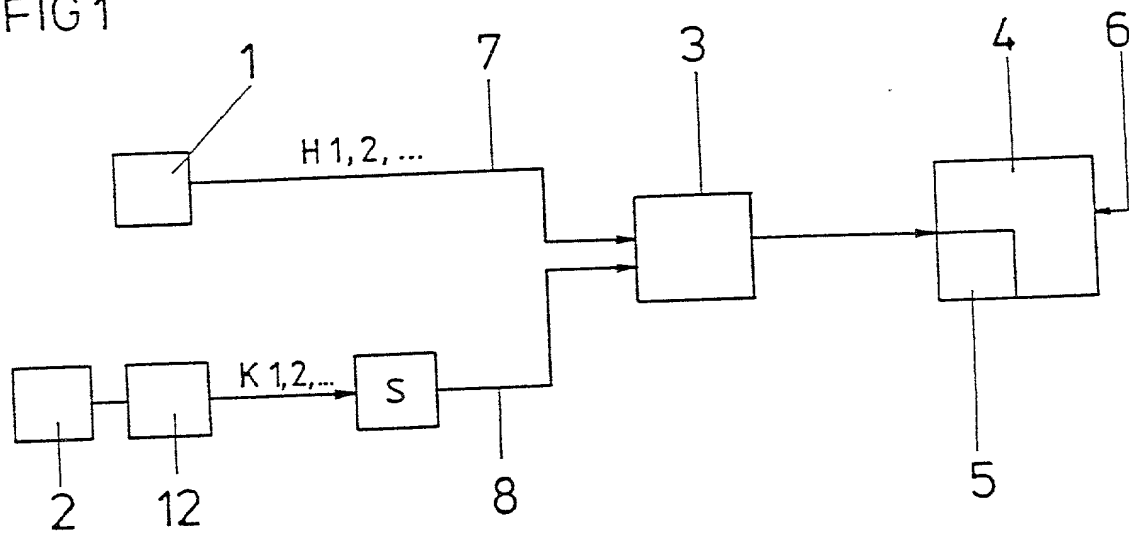


FIG 2a

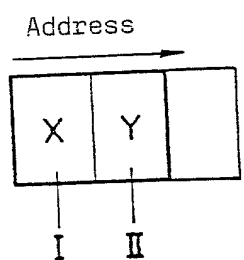


FIG 2b

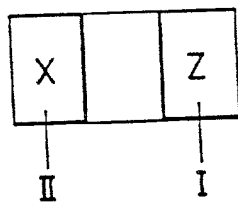


FIG 2c

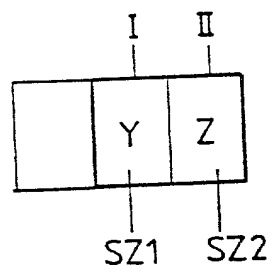
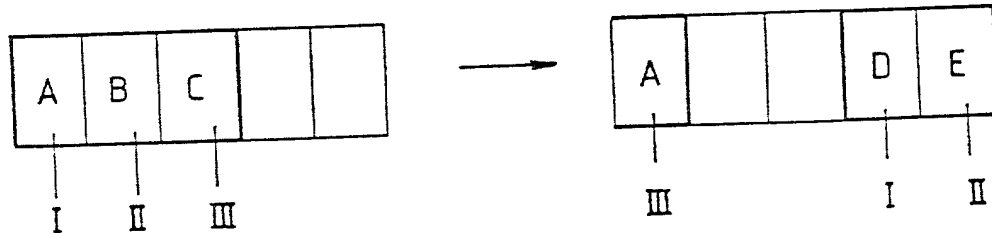


FIG 3



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I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

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PCT/DE99/02994	17 September 1999	Pending
(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)

_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)

_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

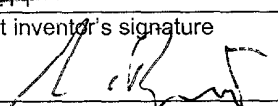
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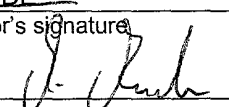
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